

Mass and Related Quantities, Sweden, SP (Swedish National Testing and Research Institute)

Calibration or Measurement Service			Measurand Level or Range			Measurement Conditions/Independent Variable		Expanded Uncertainty					Comments	NMI Service Identifier
Class	Instrument or Artifact	Instrument Type or Method	Minimum value	Maximum value	Units	Parameter	Specifications	Value	Units	Coverage Factor	Level of Confidence	Is the expanded uncertainty a relative one?		
Mass	Mass standards	Comparison in air	1	100	mg			0.4 to 1	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	0.1	1	g			1 to 3	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	g			3 to 6	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	10	100	g			6 to 16	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	0.1	1	kg			16 to 70	µg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1	10	kg			0.07 to 1.5	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	10	50	kg			1.5 to 15	mg	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	50	100	kg			0.015 to 1.5	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	100	500	kg			1.5 to 5	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	

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Mass	Mass standards	Comparison in air	500	1000	kg			5 to 15	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Mass	Mass standards	Comparison in air	1000	5000	kg			15 to 80	g	2	95%	No	Uncertainty scales with measurand level. The volume of the mass standards is known.	
Volume of solid	Mass standard: 50 mg to 0.5 g	Hydrostatic weighing	0.006	0.06	cm ³	Reference temperature	21 °C	0.04 to 0.08	mm ³	2	95%	No		
Volume of solid	Mass standard: 0.5 g to 10 g	Hydrostatic weighing	0.06	1.2	cm ³	Reference temperature	21 °C	0.08 to 0.3	mm ³	2	95%	No		
Volume of solid	Mass standard: 10 g to 0.1 kg	Hydrostatic weighing	1.2	12.5	cm ³	Reference temperature	21 °C	0.3 to 0.6	mm ³	2	95%	No		
Volume of solid	Mass standard: 0.1 kg to 2 kg	Hydrostatic weighing	12.5	250	cm ³	Reference temperature	21 °C	0.6 to 13	mm ³	2	95%	No		
Volume of solid	Mass standard: 2 kg to 20 kg	Hydrostatic weighing	250	2500	cm ³	Reference temperature	21 °C	100 to 950	mm ³	2	95%	No		
Volume of solid	Mass standard: 20 kg to 50 kg	Hydrostatic weighing	2500	6300	cm ³	Reference temperature	21 °C	1200 to 3000	mm ³	2	95%	No		
Volume of solid	Solid density standard, mass: 0.1 kg to 1 kg	Hydrostatic weighing	87	315	cm ³	Reference temperature	21 °C	1.4 to 5.6	mm ³	2	95%	No		

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Density of solid	Solid sample, mass: 0.1 kg to 1 kg	Hydrostatic weighing	800	18000	kg/m ³	Reference temperature	10 °C to 50 °C	0.1 to 10	kg/m ³	2	95%	No		
Absolute pressure	Vacuum gauge		5E-04	3	Pa			$(3.0E-05 + 2.7E-02p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.4E-05 Pa to 8.1E-02 Pa	
Absolute pressure	Vacuum gauge		3	1.33E+02	Pa			$(0.12 + 6.0E-03p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.4E-01 Pa to 9.2E-01 Pa	
Absolute pressure	Vacuum gauge		1.33E+02	3.5E+03	Pa			$(1.2 + 9E-04p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.3 Pa to 4.4 Pa	
Absolute pressure	Pressure gauge	Gas medium	3.5E+03	1.4E+05	Pa			$(0.5 + 3E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 6.1E-01 Pa to 4.7 Pa	
Absolute pressure	Pressure balance	Gas medium	1.4E+05	5.2E+06	Pa			$(4.6 + 2.6E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 8.3 Pa to 1.4E+02 Pa	
Differential pressure	Pressure gauge	Gas medium	1	3.2E+03	Pa			$(0.08 + 7E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 8.0E-02 Pa to 3.0E-01 Pa	
Differential pressure	Pressure gauge	Gas medium	3.2E+03	1.3E+04	Pa			$(1.5 + 7E-04p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 3.7 Pa to 1.1E+01 Pa	
Gauge pressure	Pressure balance	Gas medium	3.5E+03	1.1E+04	Pa			$(0.2 + 2.5E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.9E-01 Pa to 4.8E-01 Pa	
Gauge pressure	Pressure balance	Gas medium	1.1E+04	1.35E+05	Pa			$(0.2 + 2.2E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 4.4E-01 Pa to 3.2 Pa	
Gauge pressure	Pressure balance	Gas medium	1.35E+05	5.0E+06	Pa			$(4.6 + 3.0E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 8.7 Pa to 1.5E+02 Pa	
Gauge pressure	Pressure balance	Gas medium	5.0E+06	4.0E+07	Pa			$(2.7 + 5.0E-05p)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 2.5E+02 Pa to 2.0E+03 Pa	

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Gauge pressure	Pressure balance	Oil medium	5.0E+05	5.0E+07	Pa			$(3.7E-05p + 1.7E-13p^2)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 1.9E+01 Pa to 2.3E+03 Pa	
Gauge pressure	Pressure balance	Oil medium	5.0E+07	5.0E+08	Pa			$(5.2E-05p + 2E-13p^2)$, p pressure in Pa	Pa	2	95%	No	Uncertainty values range from 3.1E+03 Pa to 7.6E+04 Pa	
Force: tension and compression	Force measuring device	Deadweight	1	2000	N			0.01	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Deadweight	0.25	100	kN			0.005	%	2	95%	Yes		
Force: tension and compression	Force measuring device	Lever amplification	2.5	1000	kN			0.01	%	2	95%	Yes		
Force: compression	Force measuring device	Build-up system	0.1	6	MN			0.05	%	2	95%	Yes		
Volume	Glassware	Pipettes, burettes, pycnometers	10	100	ml	Temperature	room temperature	0.02	%	2	95%	Yes	Contained / delivered volume	SE1
Volume	Glassware	Any type of instruments	0.1	1	l	Temperature	room temperature	0.01	%	2	95%	Yes	Contained / delivered volume	SE2
Volume	Glassware, proving tanks	Any type of instruments	1	20	l	Temperature	room temperature	0.01	%	2	95%	Yes	Contained / delivered volume	SE3
Volume	Proving tanks	Any type of instruments	20	400	l	Temperature	room temperature	0.01	%	2	95%	Yes	Contained volume	SE4
Volume	Proving tanks	Any type of instruments	400	4000	l	Temperature	room temperature	0.02	%	2	95%	Yes	Contained volume	SE5
Volume	Storage tanks	Cylindrical standing	30	200000	m ³	Temperature	15 °C or 20 °C	0.1 to 0.05	%	2	95%	Yes	Geometric volume	SE6
Volume	Storage tanks	Unregular form	1	100	m ³	Temperature	20 °C	0.3 to 0.2	%	2	95%	Yes	Contained volume	SE7

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Dynamic volume	Water meter	Any type of instruments	1	3500	l	Liquid	water	0.1	%	2	95%	Yes		SE8
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							
Dynamic volume	Water meter	Any type of instruments	1	5	l	Liquid	water	0.1	%	2	95%	Yes		SE9
						Temperature	10 °C to 30 °C							
						Pipe size	DN 25							
Dynamic volume	Water meter	Any type of instruments	20	60	l	Liquid	water	0.1	%	2	95%	Yes		SE10
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							
Dynamic volume	Water meter	Any type of instruments	250	250	l	Liquid	water	0.1	%	2	95%	Yes		SE11
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							
Dynamic volume	Water meter	Any type of instruments	500	3500	l	Liquid	water	0.1	%	2	95%	Yes		SE12
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							
Dynamic volume/mass	Water meter	Any type of instruments including Coriolis	50	800	l/kg	Liquid	water	0.08	%	2	95%	Yes		SE13
						Temperature	10 °C to 30 °C							
						Pipe size	DN 40							
Dynamic volume/mass	Water meter	Any type of instruments including Coriolis	50	800	l/kg	Liquid	water	0.1	%	2	95%	Yes		SE14
						Temperature	30 °C to 90 °C							
						Pipe size	DN 40							

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Dynamic volume	Water meter	Any type of instruments	1	5	l	Liquid	water	0.2	%	2	95%	Yes		SE15
						Temperature	30 °C to 90 °C							
						Pipe size	DN 25							
Dynamic volume	Water meter	Any type of instruments	20	60	l	Liquid	water	0.15	%	2	95%	Yes		SE16
						Temperature	30 °C to 90 °C							
						Pipe size	DN 300							
Dynamic volume	Water meter	Any type of instruments	250	250	l	Liquid	water	0.15	%	2	95%	Yes		SE17
						Temperature	30 °C to 90 °C							
						Pipe size	DN 300							
Dynamic volume	Water meter	Any type of instruments	500	3500	l	Liquid	water	0.15	%	2	95%	Yes		SE18
						Temperature	30 °C to 90 °C							
						Pipe size	DN 300							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	10	5000	l	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE19
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	10	2000	l	Liquid	gas oil 1 cSt	0.1	%	2	95%	Yes		SE20
						Temperature	15 °C to 30 °C							
						Pipe size	DN 100							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	20	60	l	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE21
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							

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Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	20	60	l	Liquid	gas oil 1 cSt	0.1	%	2	95%	Yes		SE22
						Temperature	15 °C to 30 °C							
						Pipe size	DN 100							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	250	250	l	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE23
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	500	3500	l	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE24
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Dynamic volume	Volume meter	Positive displacement meter, turbin, etc.	20	60	l	Liquid	oil 20-80 cSt	0.1	%	2	95%	Yes		SE25
						Temperature	15 °C to 70 °C							
						Pipe size	DN 50							
Volume flow rate	Flow meter	Puls, analog or visual output	0.0017	117	l/s	Liquid	water	0.1	%	2	95%	Yes		SE26
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							
Volume flow rate	Flow meter	Puls, analog or visual output	2	117	l/s	Liquid	water	0.1	%	2	95%	Yes		SE27
						Temperature	10 °C to 30 °C							
						Pipe size	DN 300							

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Volume flow rate	Flow meter	Puls, analog or visual output	0.015	6.5	l/s	Liquid	water	0.08	%	2	95%	Yes		SE28
						Temperature	10 °C to 30 °C							
						Pipe size	DN 40							
Volume flow rate	Flow meter	Puls, analog or visual output	0.0017	1.5	l/s	Liquid	water	0.2	%	2	95%	Yes		SE29
						Temperature	30 °C to 90 °C							
						Pipe size	DN 25							
Volume flow rate	Flow meter	Puls, analog or visual output	0.1	117	l/s	Liquid	water	0.1	%	2	95%	Yes		SE30
						Temperature	30 °C to 90 °C							
						Pipe size	DN 300							
Volume flow rate	Flow meter	Puls, analog or visual output	2	117	l/s	Liquid	water	0.1	%	2	95%	Yes		SE31
						Temperature	30 °C to 90 °C							
						Pipe size	DN 300							
Mass flow rate	Flow meter	Puls, analog or visual output	0.015	6.5	kg/s	Liquid	water	0.08	%	2	95%	Yes		SE32
						Temperature	10 °C to 90 °C							
						Pipe size	DN 40							
Mass flow rate	Flow meter	Puls, analog or visual output	0.1	117	kg/s	Liquid	water	0.1	%	2	95%	Yes		SE33
						Temperature	10 °C to 90 °C							
						Pipe size	DN 300							
Volume flow rate	Flow meter	Puls, analog or visual output	0.1	117	l/s	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE34
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							

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Volume flow rate	Flow meter	Puls, analog or visual output	2	117	l/s	Liquid	gas oil 5 cSt	0.1	%	2	95%	Yes		SE35
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Volume flow rate	Flow meter	Puls, analog or visual output	0.1	117	l/s	Liquid	gas oil 1 cSt	0.1	%	2	95%	Yes		SE36
						Temperature	15 °C to 30 °C							
						Pipe size	DN 100							
Volume flow rate	Flow meter / on site	Puls, analog or visual output	0.1	350	l/s	Liquid	up to 300 cSt including LPG	0.1	%	2	95%	Yes		SE37
						Temperature	-20 °C to +120 °C							
						Pipe size	DN 250							
Volume flow rate	Flow meter	Puls, analog or visual output	0.1	7	l/s	Liquid	oil 20-80 cSt	0.1	%	2	95%	Yes		SE38
						Temperature	15 °C to 70 °C							
						Pipe size	DN 50							
Mass flow rate	Flow meter	Puls, analog or visual output	0.1	95	kg/s	Liquid	gas oil 5 cSt	0.15	%	2	95%	Yes		SE39
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Mass flow rate	Flow meter	Puls, analog or visual output	0.1	95	kg/s	Liquid	gas oil 5 cSt	0.15	%	2	95%	Yes		SE40
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							
Mass flow rate	Flow meter	Puls, analog or visual output	0.1	95	kg/s	Liquid	gas oil 5 cSt	0.15	%	2	95%	Yes		SE41
						Temperature	15 °C to 30 °C							
						Pipe size	DN 200							

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Mass flow rate	Flow meter	Puls, analog or visual output	0.1	6	kg/s	Liquid	oil 20-80 cSt	0.15	%	2	95%	Yes		SE42
						Temperature	15 °C to 70 °C							
						Pipe size	DN 65							
Mass flow rate	Flow meter / on site	Puls, analog or visual output	0.1	300	kg/s	Liquid	up to 300 cSt including LPG	0.15	%	2	95%	Yes		SE43
						Temperature	-20 °C to +120 °C							
						Pipe size	DN 250							